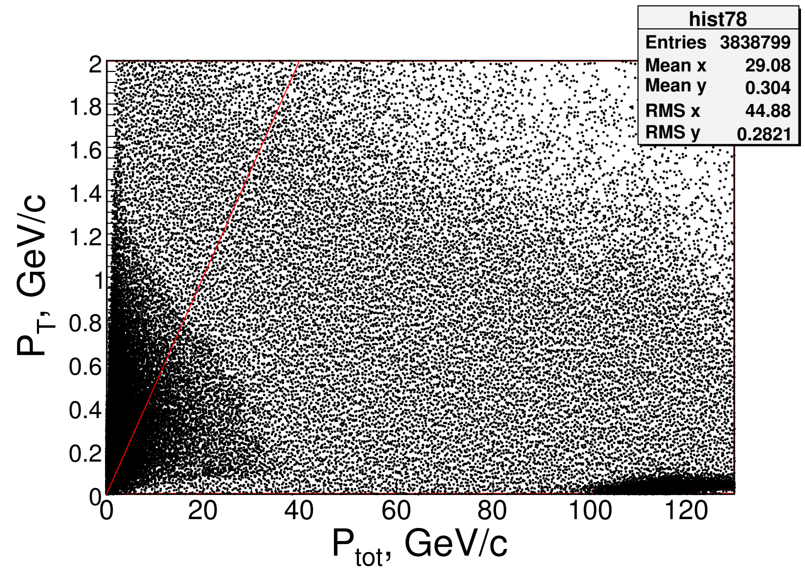
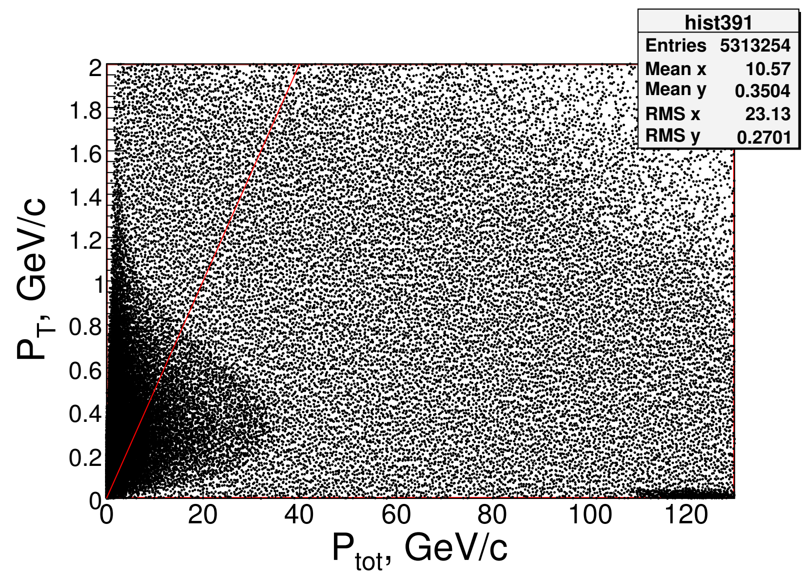
Inclusive Neutron Update: Systematics

RICH acceptance for inclusive protons

Additional charged track requirement

RICH acceptance: P_T vs P_{tot}





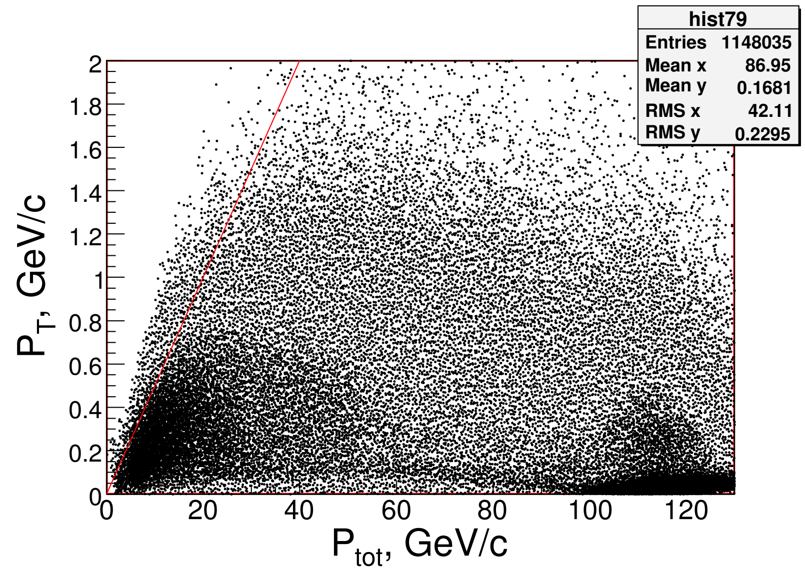
Event selection:

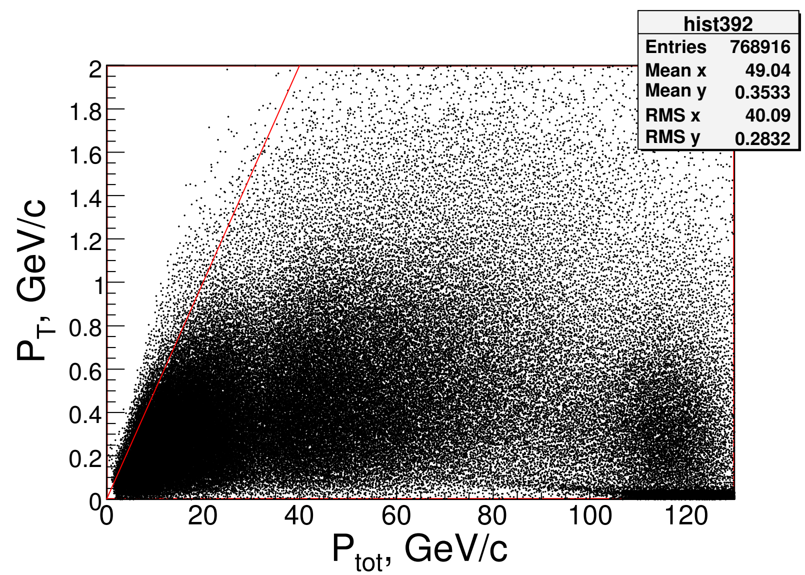
- Z vertex OK, number of TPC hits, track time, q = 1

Top plot - the p_T vs p_{tot} scatter plot for any positive charged track in real data. The red line shows the limit for 50$\%$ geometric acceptance by the RICH PMT array (Andre). One can assume that the data above the red line will be cut-out, when the valid RICH ring will be required.

Bottom plot - the p_T vs p_{tot} scatter plot using Monte Carlo data

track has RICH ring: P_T vs P_{tot}



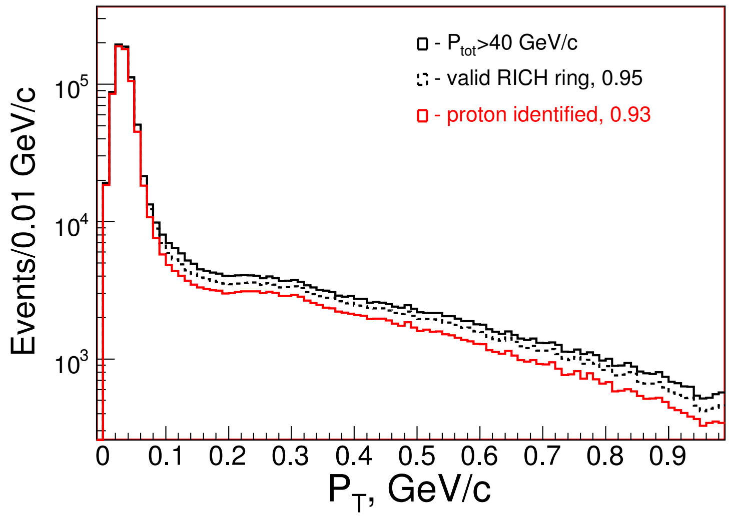


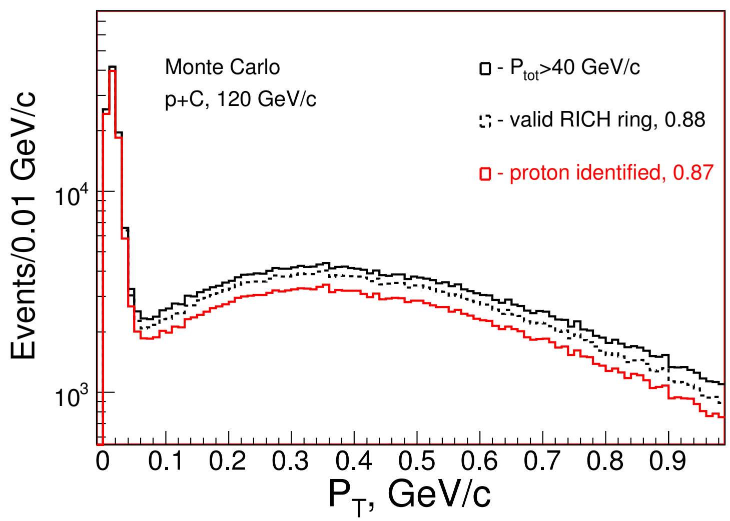
Event selection: same as on previous page. Consider tracks with the valid RICH ring. The radius value not checked for the proper particle ID.

Top plot - the track has the RICH ring. This is a real data. The valid RICH ring requirements kills about 70% of the soft tracks.

Bottom plot - the Monte Carlo track has the RICH ring. About 85% of the tracks were dropped.

P_T for identified proton track





The p_T distributions for the positively charged tracks with $p_{tot} > 40$ GeV/c - the solid line plots. The dashed plot illustrates the cases when the track associated with the valid RICH ring. The red plots shows the tracks were identified as protons.

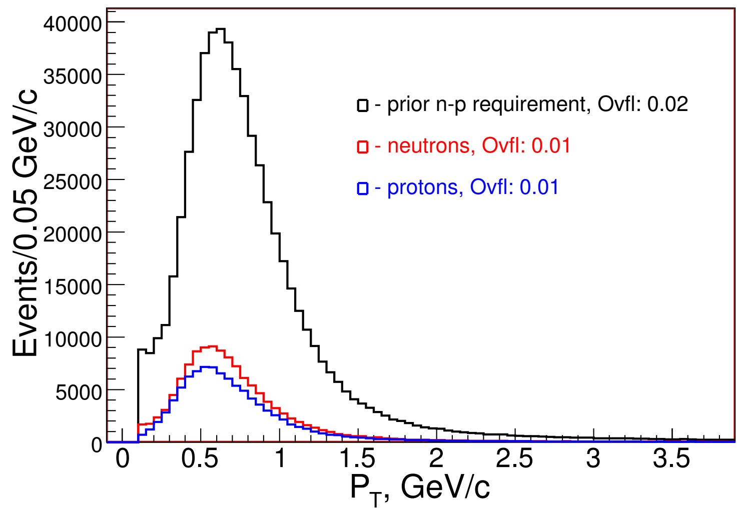
Top plot - a real data.

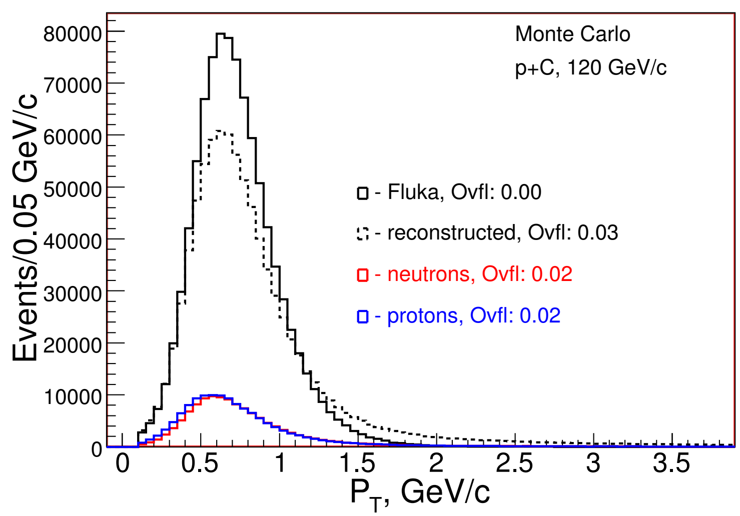
Bottom plot - Monte Carlo data

Plots shows that the valid RICH ring availability is 7% differ in data vs Monte Carlo. This suggests to make separate the RICH acceptance calculations for the data and for Monte Carlo.

The proton identification efficiency reflects the proton diffraction dissociation rate.

P_T for an additional charged track



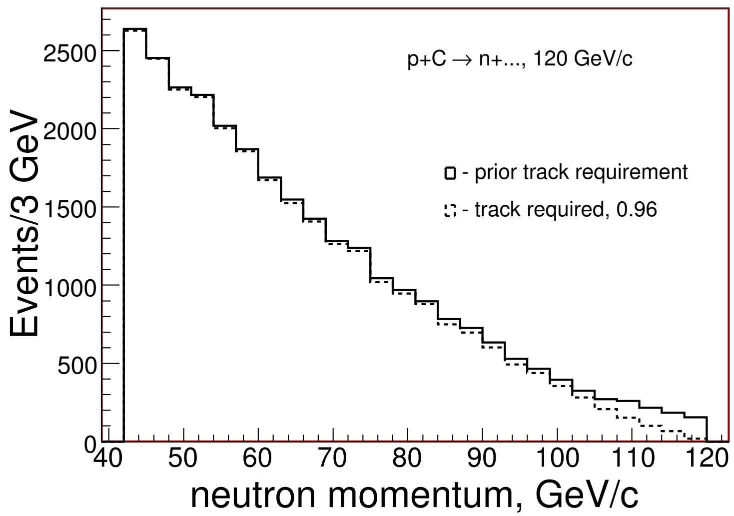


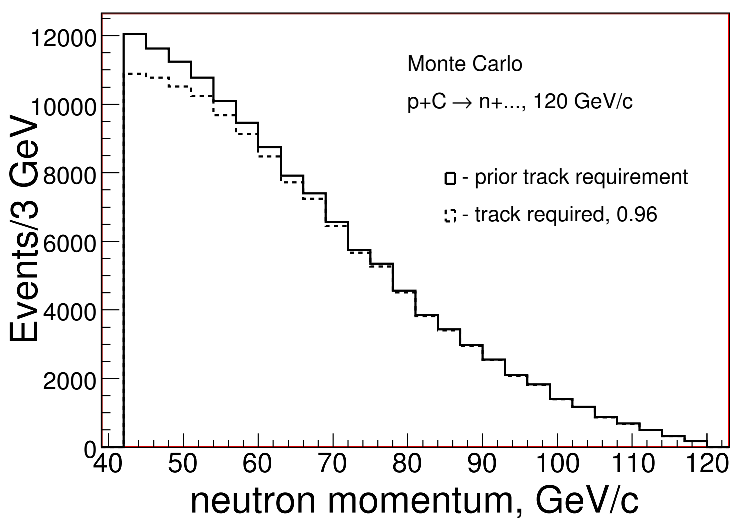
Requiring an additional charged track ($p_{tot} > 0.5$ GeV/c) we hope to equilize the trigger conditions for the neutrons in compare with protons. Is any issues here?
Requirements: primary vertex, $0.5 < p_{tot} < 30$ GeV/c, $p_T > 0.1$ GeV/c, if more than one, then choose that with highest p_T value.

Top plot - the p_T distribution for the real data.
Bottom plot - the p_T distribution for the Monte Carlo data

Are these tracks within the trigger scintillator? Yes. The highest possible angle is about 4/40=0.1, the deviation from the beam line is 0.1*5cm(Z)=0.5 cm. The scintillator narrower size (horizontal) is $\pm$2.7 cm.

neutron with an additional charged track





How an additional charged track requirement effecting the neutron momentum?

Top plot - the p_{tot} distribution for the inclusive neutrons in the real data.

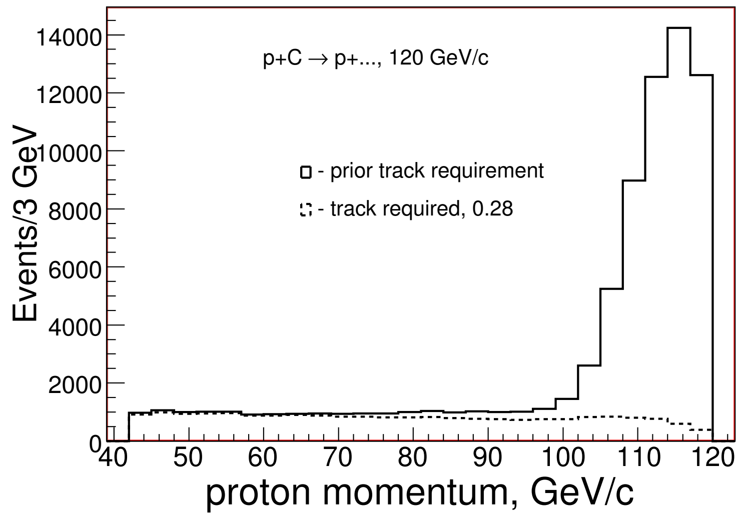
Bottom plot - the p_{tot} distribution for the Monte Carlo data

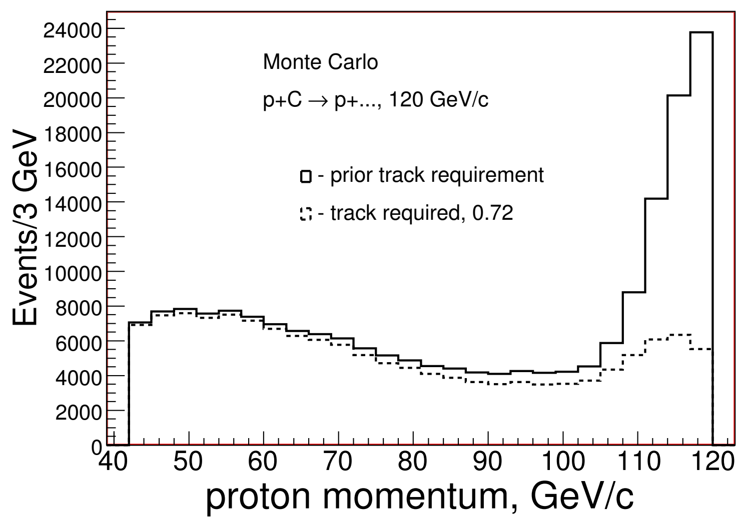
Effect of an additional charged track requirements is small, about 4%. But in the read data it effecting on the high momentum end, while in Monte Carlo - on low momentum end.

University of Michigan

MIPP

proton with an additional charged track





How an additional charged track requirement effecting the proton momentum?

Top plot - the p_{tot} distribution for the inclusive protons in the real data.

Bottom plot - the p_{tot} distribution for the Monte Carlo data

Effect of an additional charged track requirements is dramatic. It kills an exclusive diffraction dissociation peak. Factor 2 difference in the high momentum peak can be explained by fact that protons in data is going through the target without interactions. In Monte Carlo each event is the interaction.